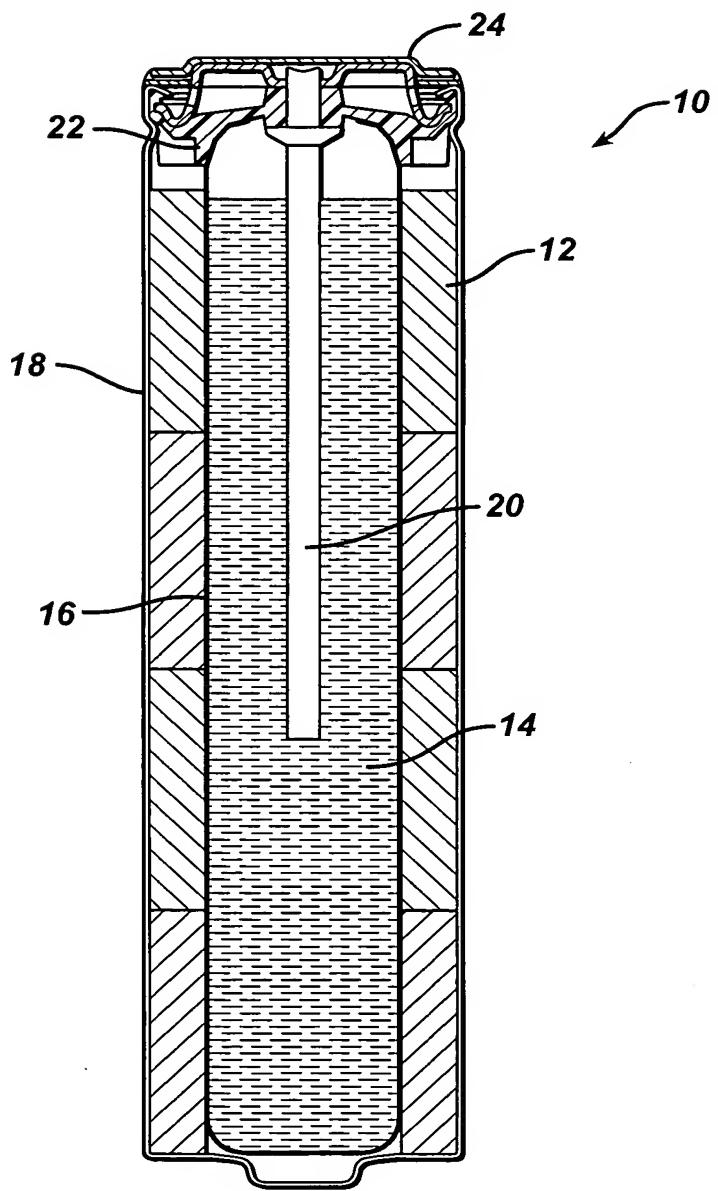


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FIG. 1



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FIG. 2

Theoretical Volumetric Capacities and Energy Densities (total cell)
for 1.5V alkaline zinc cells containing metal bismuth oxides.

Cathode Material	Electrons per formula unit	Theoretical Specific Capacity (mAh/g)	Average CCV (V)	Density (g/cm ³)	Theoretical Volumetric Capacity (Ah/cm ³)	Theoretical Energy Density (total cell) (Wh/L)
KBiO ₃	2	181	1.65	5.87	1.06	1483
AgBiO ₃	3	220	1.4	8.18	1.80	1930
ZnBi ₂ O ₆	4	185	1.65	8.44	1.56	2035
MgBi ₂ O ₆	4	199	1.68	7.92	1.58	2088
CdBi ₂ O ₆	4	171	(1.5) ^b	(8.2) ^b	1.40	1698
Cu ₂ Bi ₂ O ₇	6	245	(1.4) ^b	(8.2) ^b	2.01	2093

^a assuming discharge capacity of cathode and anode balanced

^b estimated value

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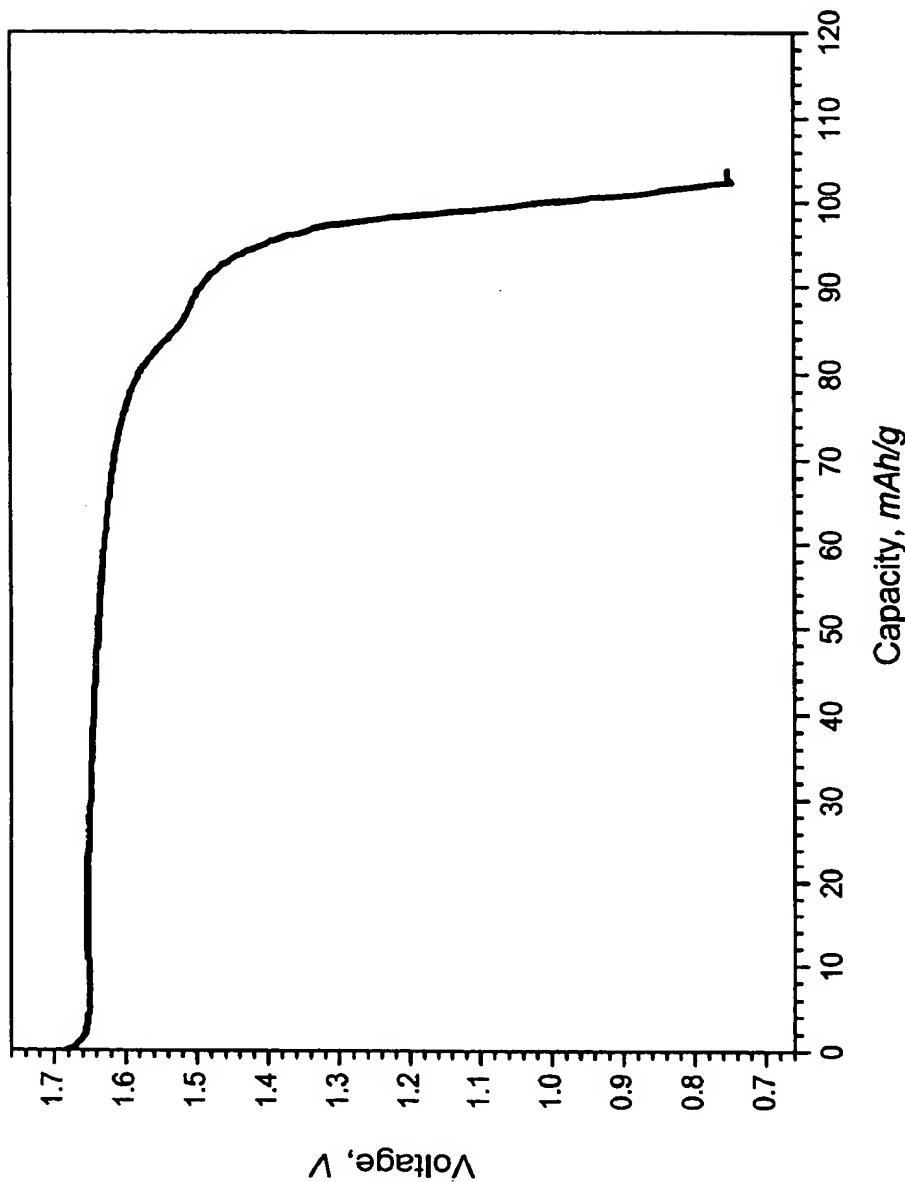
FIG. 3

Example	M =	Calculated (weight percent)				Observed (weight percent)			
		Na	Co	M	Bi	Na (ppm)	Co	M	Bi
1a	Zn	0	0	11.29	72.14	81	---	10.85	65.88
1b	Zn	0	1.92	10.95	69.98	75	1.46	8.09	66.22
2a	Mg	0	0	4.52	77.65	---	---	---	---
2b	Mg	0	1.92	4.38	75.32	<34	1.95	4.05	68.00
3	Cu	0	0	19.34	63.61	<44	---	14.45	60.29
4	Ag	0	0	29.57	57.28	7200	---	27.66	52.73

"---" = not analyzed

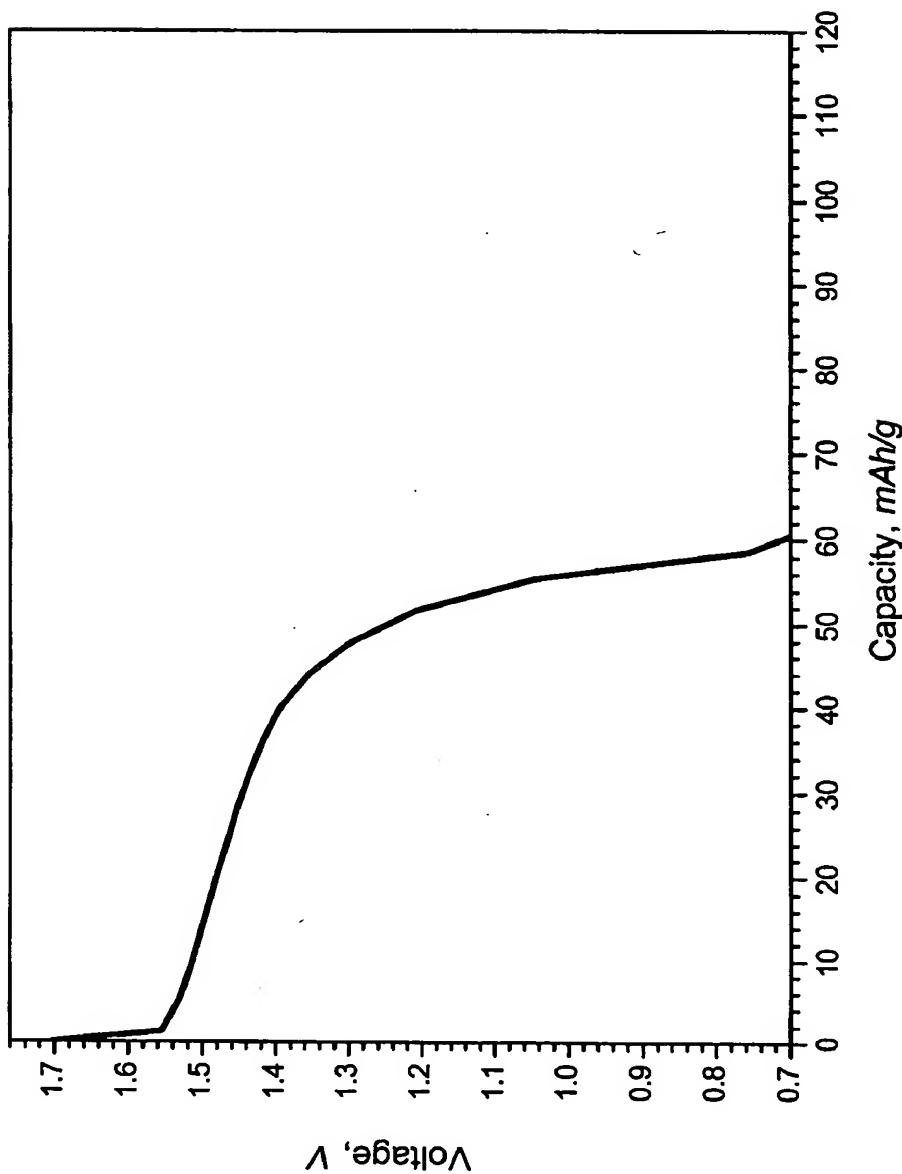
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FIG. 4



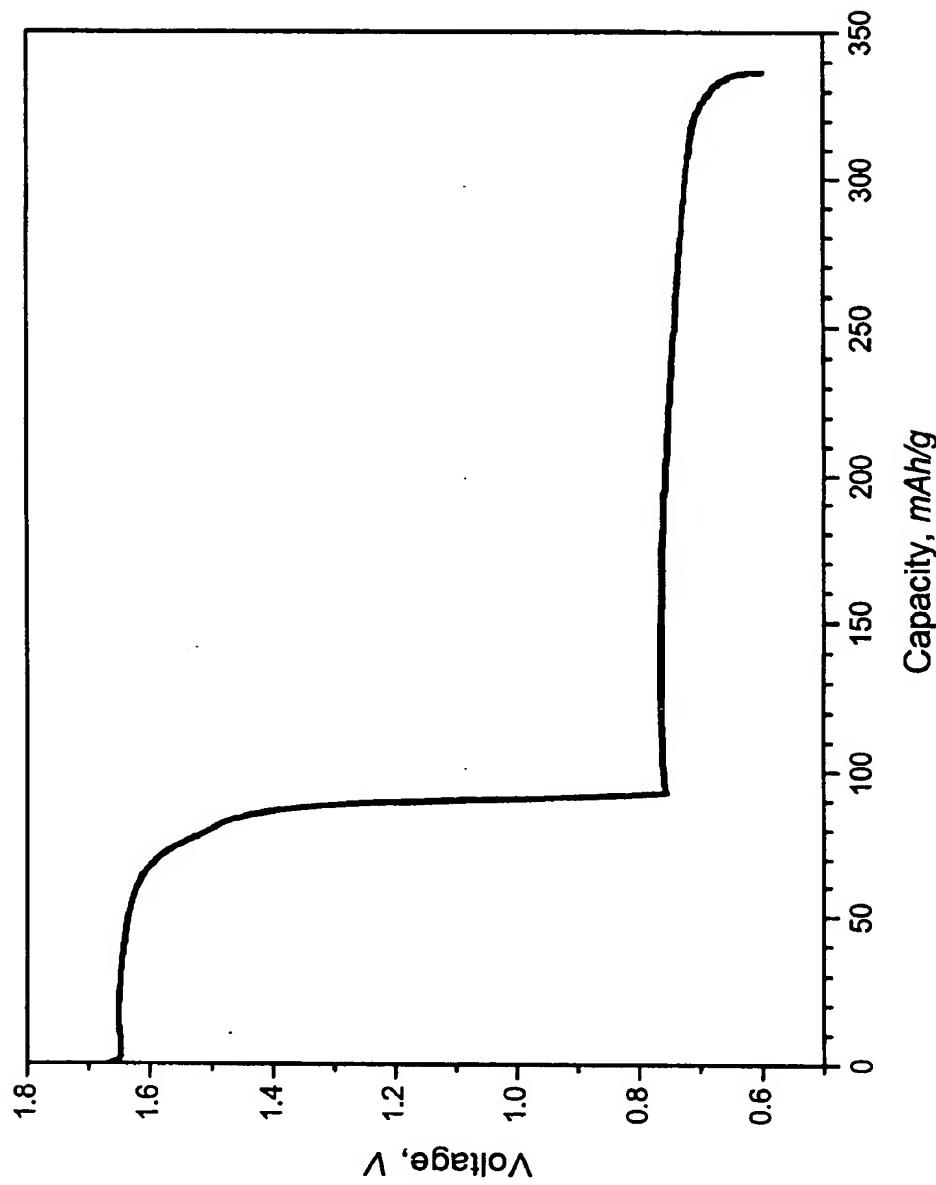
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FIG. 5



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FIG. 6



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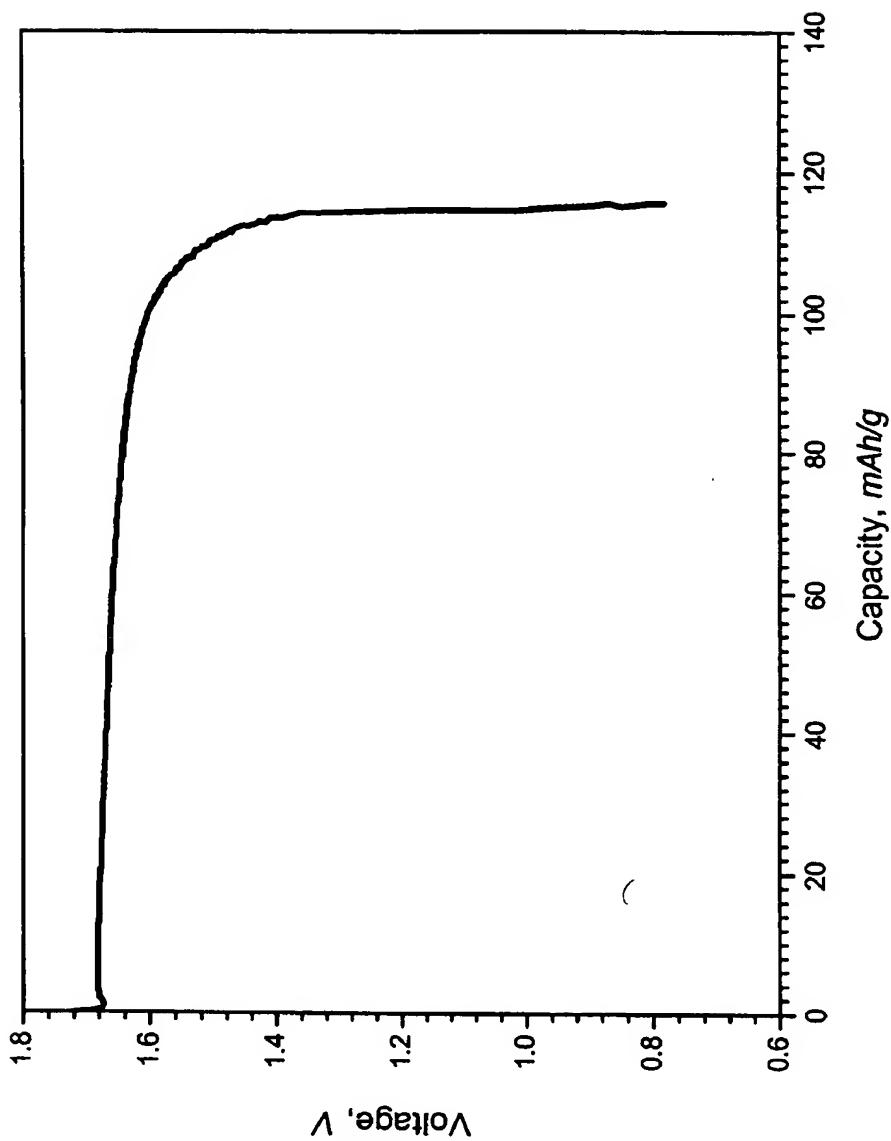
FIG. 7

<i>Example</i>	Cathode Material	Low-rate Capacity To 0.8 V (mAh/g)	Percent Utilization	Low-rate Capacity To 0.6 V (mAh/g)	Percent Utilization	High-rate Capacity To 0.8 V (mAh/g)	Percent Utilization	High-rate Capacity To 0.6 V (mAh/g)	Percent Utilization
1a	ZnBi ₂ O ₆	30	16	ND	ND	ND	ND	ND	ND
1b	CoOOH-coated ZnBi ₂ O ₆	102	55	335	72	58	31	ND	ND
2a	MgBi ₂ O ₆	77	40	309	62	85	43	300	60
2b	CoOOH-coated MgBi ₂ O ₆	116	58	345	68	89	45	310	60
3	Cu ₂ Bi ₂ O ₇	50	20	360	63	35	14	170	30
4	AgBiO ₃	170	77	310	70	165	75	360	81
5a	KBiO ₃	100	55	357	79	70	39	315	69
5b	CoOOH-coated KBiO ₃	105	58	375	83	80	45	205	45
C1	NaBiO ₃	20	10	325	74	ND	ND	ND	ND
C2	Bi ₂ O ₄	20	18	336	75	0	0	360	81
C3	Bi ₂ O ₃	0	0	260	75	0	0	155	45

ND = not determined

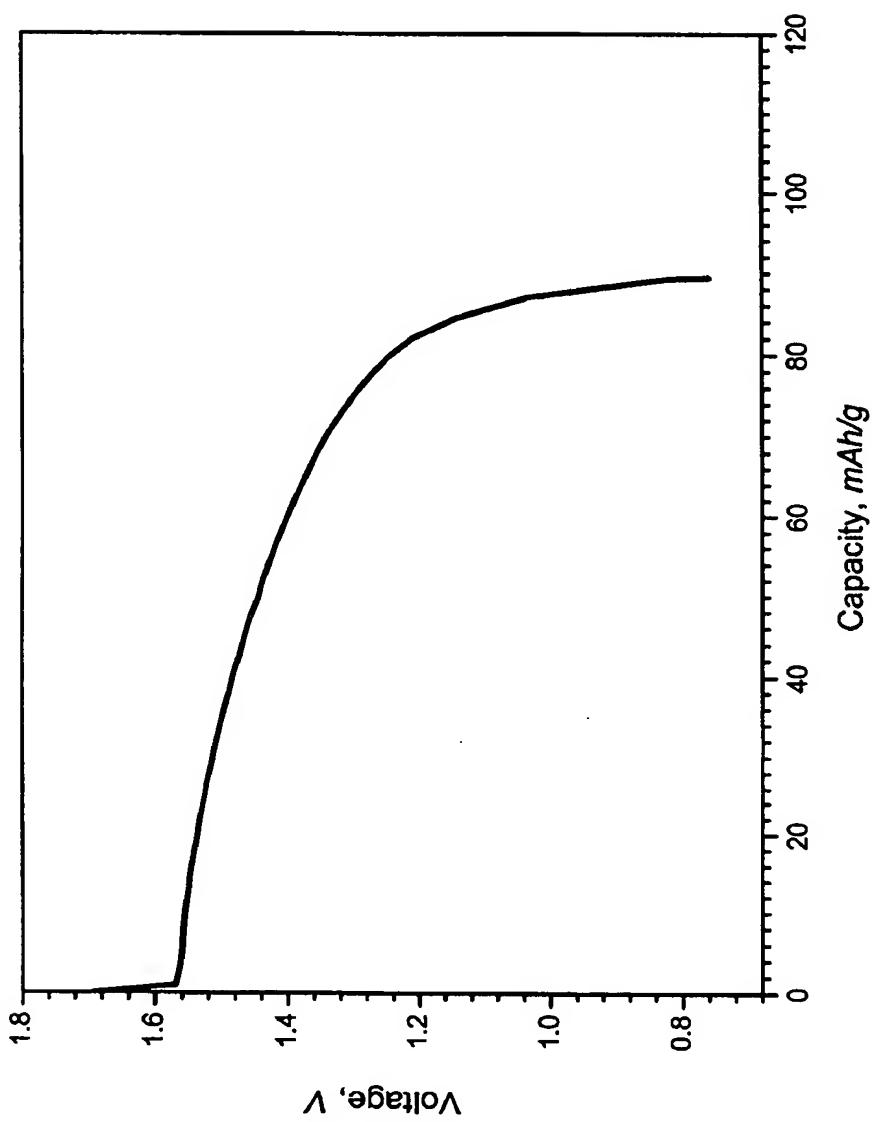
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FIG. 8



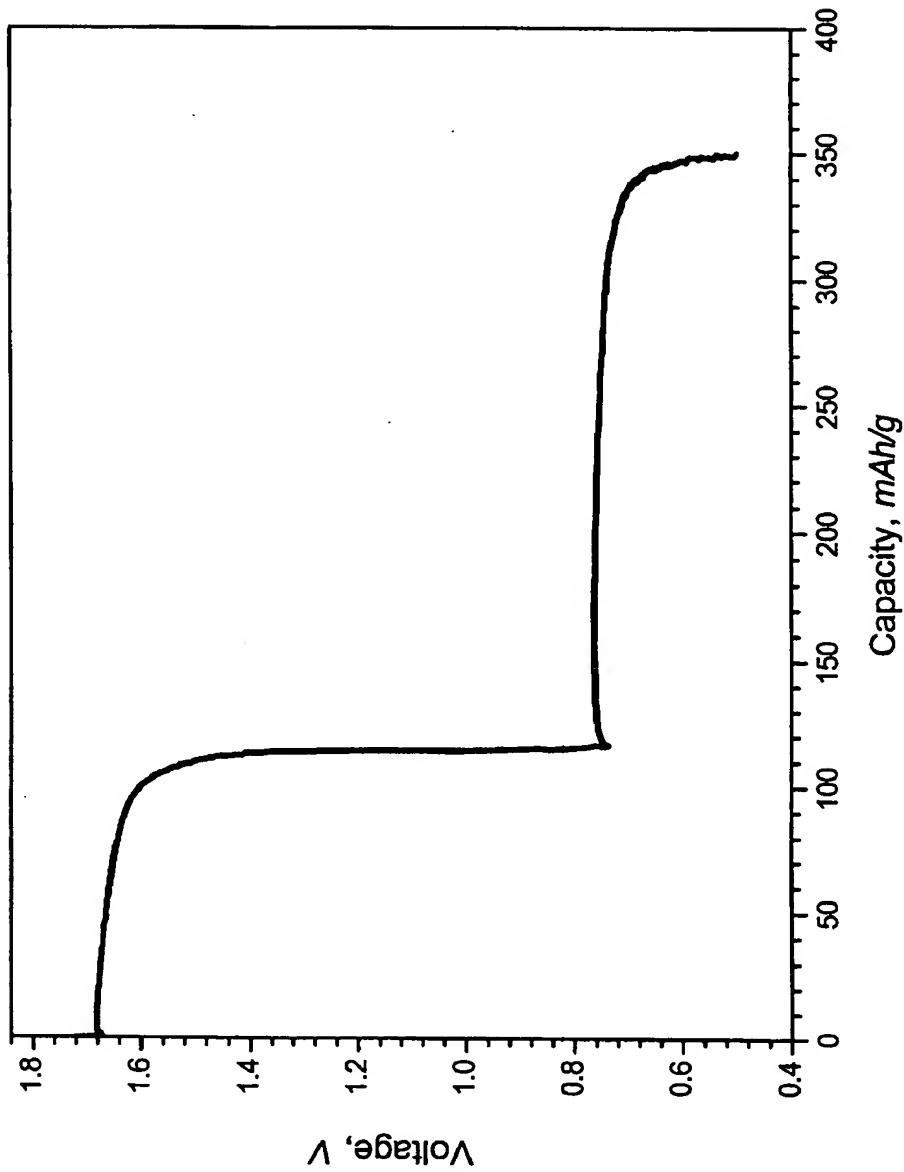
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FIG. 9



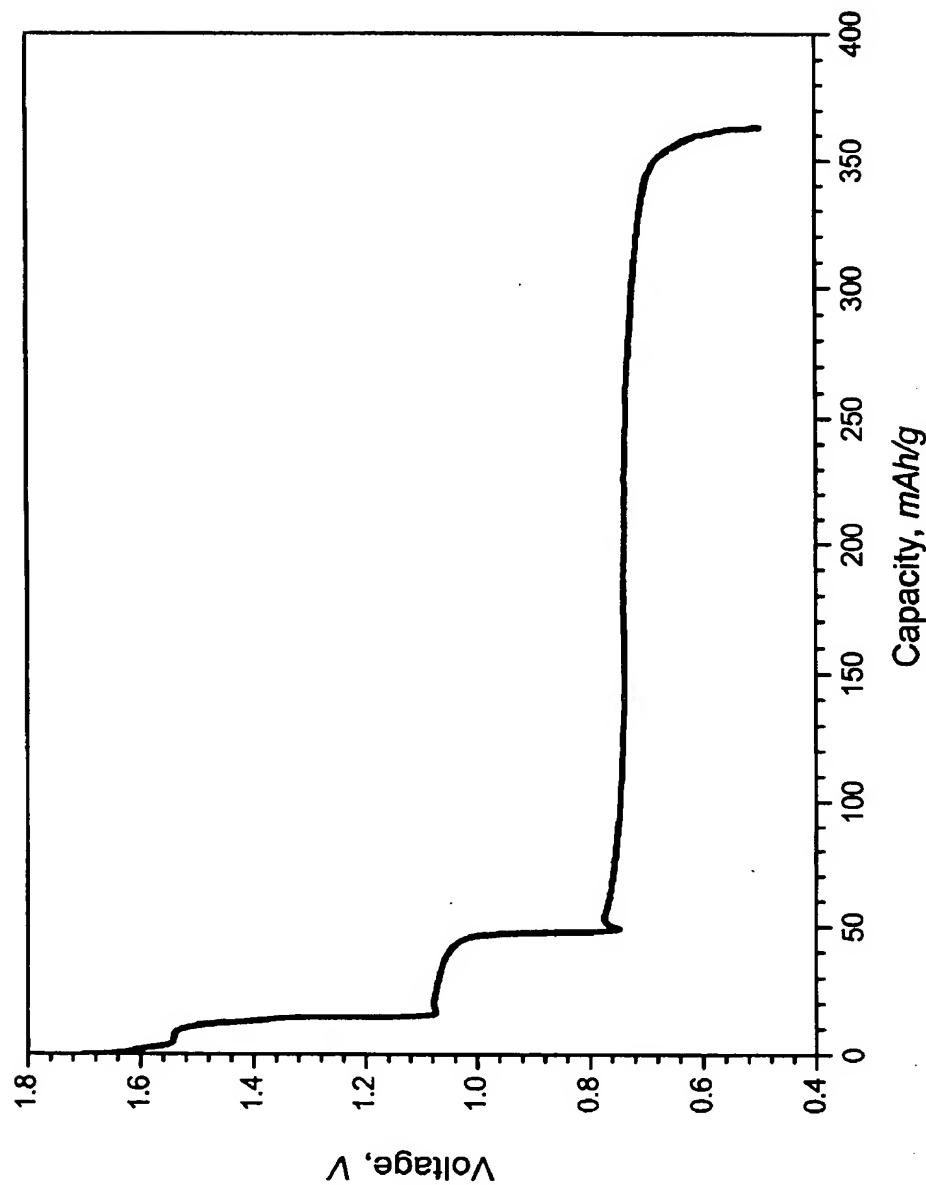
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FIG. 10



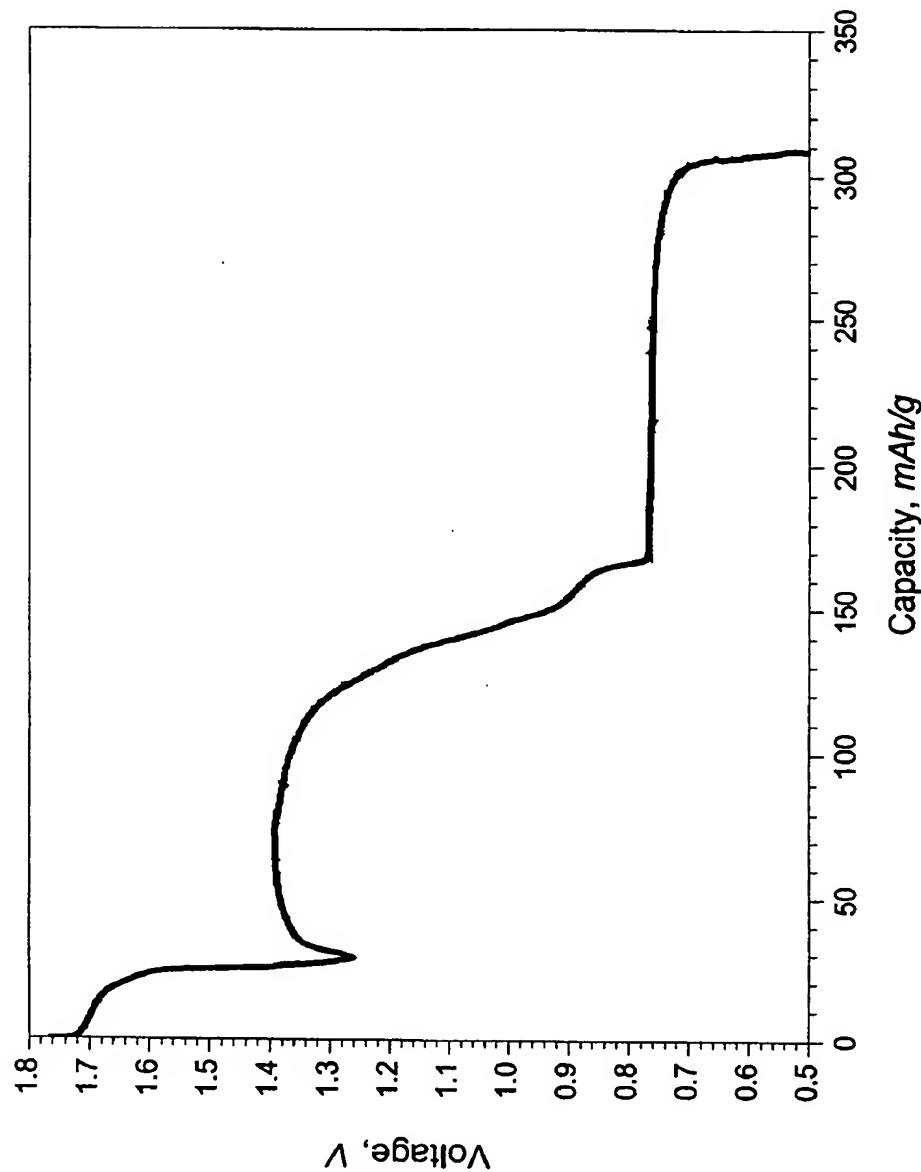
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FIG. 11



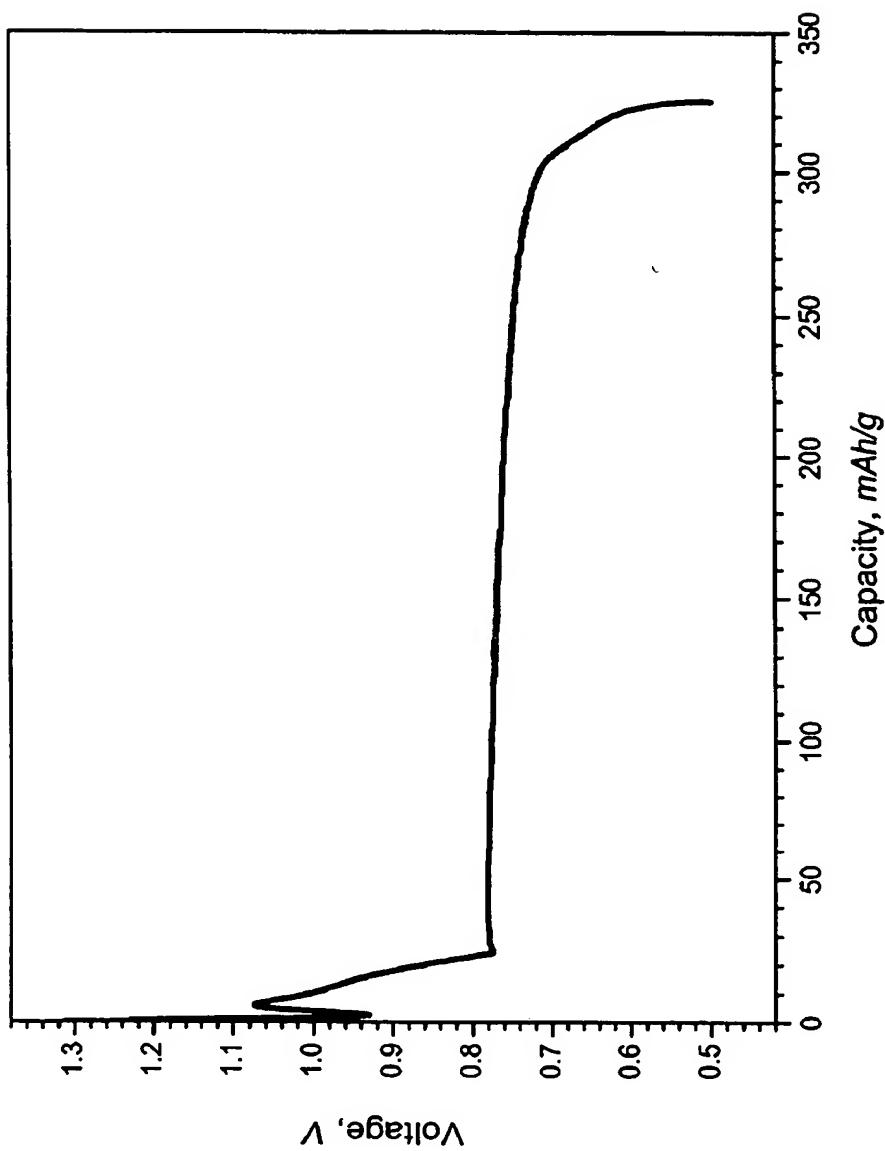
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FIG. 12



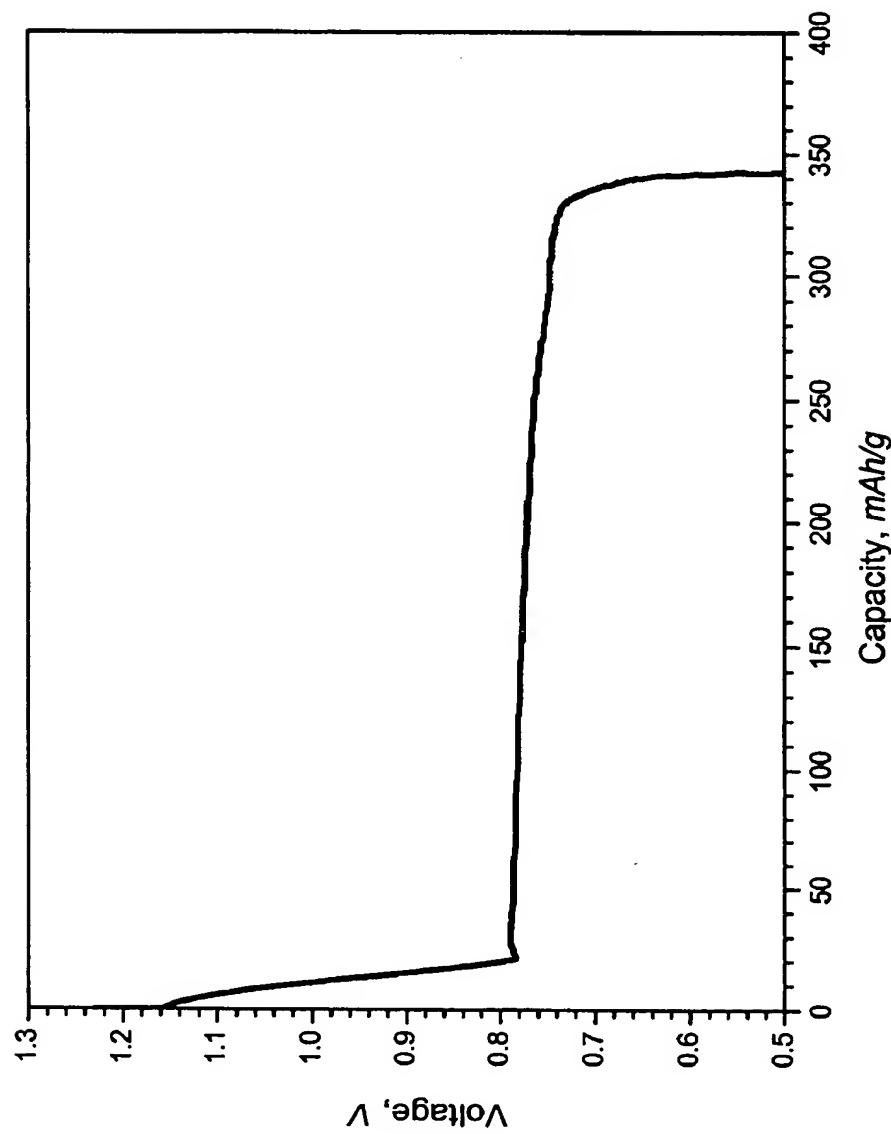
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FIG. 13



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FIG. 14



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FIG. 15

